Electronic Charting – the users' view

In an era when organisations are being constantly urged to become more 'customer focused' it is interesting to note that most of the debate regarding electronic charting matters has seemingly little, and surely insufficient, input from the user at sea, says Chris Smith, the UK Hydrographics Office's technical implementation manager.

In July of this year IMO will once again consider the legal status of the proposed Raster Chart Display System (RCDS) performance standard. The standard, if approved would permit RCDS systems using official (ie data from or approved by a national hydrographic office) raster charts to fulfil the carriage requirements of SOLAS regulations (V 20). This issue was discussed by IMO Safety of Navigation sub-committee last year (NAV 43 meeting); however some national administrations felt that there was insufficient experience to prove the safety of RCDS, so a consensus was not reached. Administrations were instead encouraged to obtain additional feedback and report back to IMO at NAV 44.

Australia, UK and USA, amongst others, are now setting about this task. In some cases ships are being authorised to use RCDS as the primary aid to navigation. It is to be hoped that: sufficient feedback is obtained to inform the debate; the users' views are carefully considered; and a consensus can at last be reached. Who is better placed to judge the safety and adequacy of RCDS systems than experienced Masters who have navigated using paper charts as the primary aid to navigation for many years?

The users' view of RCDS

It is almost two years since Broere Shipping's newly built chemical tanker *Dutch Faith* started trading and in doing so became the first ship to legally use an RCDS as the primary aid to navigation. The Dutch authorities gave permission for this mode of operation, initially for a trial period, on condition that a completely independent backup RCDS was installed, that the systems used official chart data, and that a small number of paper charts (less than 10% of the full chart outfit) were also carried. Comment from the vessel about the electronic chart system was very encouraging from the outset. The vessel was fitted with a Decca Chartmaster system using raster charts from the UKHO ARCS service. Two similarly fitted and operated new build vessels, *Dutch Spirit* and *Stella Wega*, subsequently came into service. Between them these three ships have sailed, safely and successfully, in excess of 300,000 nautical miles. The vessels' Masters continue to praise the chart systems which have proved very reliable. Significantly, they have not found any circumstances where the RCDS presents safety concerns. Instead they report that the systems have reduced workload and stress for the crew whilst enhancing vessel safety. The Dutch authorities recently informed IMO that following the success of the trails the vessels had been given permission to operate in this manner permanently.

Three other vessels have also been trading using RCDS (with ARCS charts) as the primary navigational aid. These are the Master Lemmer container ships *Sea Baltica* and *Sea Nordica* and the Arklow Shipping vessel *Arklow Castle*; all are required to carry duplicate systems and a small number of paper charts as back up. The Master of the *Arklow Castle* stated: "Without doubt it is my personal opinion that the RCDS with ARCS, if used with confidence, is far superior, more accurate, less time consuming and safer to the all - round navigation of the vessel, than more conventional means of navigation."

The UK Marine Safety Agency (MSA) recently authorised fifteen vessels to undertake RCDS trials. The vessels included ferries, oil and product tankers, research ships and dredgers from companies such as BP, F T Everard, P&O and Shell. This mixture of vessels should provide information on RCDS performance in a wide variety of situations. At the time of writing the trails had just begun and feedback was eagerly awaited.

In addition to these specific trials, feedback is being sought from others using raster fuelled systems; the UKHO is contacting about 200 SOLAS vessels using ARCS. Other countries, notably USA and Australia who have established raster chart services are also collecting information to present to the IMO at NAV 44.

The users' view of vector ENC charts

In March last year the A P Moller container vessel *Katrine Maersk* undertook what is thought to have been the first sea trial of official ENC data. This was as part of project 'SHARED', a co-operative venture between the UKHO and the Hydrographic Department of the Marine Port Authority of Singapore (HDMPA). The aim of SHARED is to assess the safety and effectiveness of hybrid electronic chart systems - those being capable of using both raster and vector data. Hybrid capability is seen as necessary as it will be some years before there is a good geographic coverage of ENC data that meets IMO requirements.

Katrine Maersk, fitted with a hybrid Sperry Vision 2100 VMS system, sailed from Singapore to to Hong Kong using HDMPA and UKHO produced ENC data for the port areas and ARCS charts in between. The ship's officers showed no reluctance to use the less familiar looking ENC data and the Sperry system provided a smooth changeover between ENC and ARCS.

Feedback from this and subsequent transits showed that users were quick to appreciate the advantages of ENC over raster data, especially the more flexible zoom capability and the simpler display. Equally, however, they were quick to point out some problems such as the number of insignificant and distracting 'alarms' generated and the very 'user unfriendly' way in which additional chart information is presented. These are problems that ENC producers and equipment manufacturers need to resolve.

There are now five vessels and three equipment manufacturers participating in SHARED. These vessels trade in European waters as well as the Far East and to generate additional feedback the UKHO has produced and supplied ENCs of the ports of Southampton, Europort and Felixstowe.

What do users require?

Feedback indicates that the continuous display of own ship position (and selected RADAR targets) relative to the charted information is, to the user, the single most important feature of an electronic chart system. So long as the user can have confidence in the system this capability provides an immediate lessening of workload and reduction in stress level when operating in confined and congested waters.

There is no doubt that the users appreciate the additional functions provided, such as the entering of route plans, danger areas etc, and subsequent voyage monitoring. However, it would appear that other more sophisticated capabilities are not widely used at present. It is a general rule that users' expectations and requirements increase over time and so this will no doubt change. It is early days for most electronic chart users and it would seem their greatest concern, other than using the basic system capabilities which bring most benefit, is to build up confidence with the systems.

This confidence is only gained if the system hardware is reliable, the software well proven and the chosen position fixing aid seen to be providing accurate positions. Equally important for safe and effective navigation is the chart database. This needs to be complete, accurate and up to date. How can the user judge this? With raster charts it is relatively easy to assess the quality of the data from the screen display and comparison with the paper charts is also easy. Vector charts are much more complex; only a small proportion of the data within the structured database is 'visible' on screen. This, combined with the simplified nature of the display makes assessment of quality and comparisons between datasets quite difficult.

Virtually all currently available digital chart databases (both raster and vector) are based on the paper charts produced by national hydrographic offices. Skilled staff in these offices sift, collate and validate hydrographic information from a wide variety of sources prior to issuing Notices to Mariners or incorporating the data into chart products. Very costly and time consuming quality assurance methods are employed to keep errors to a minimum. Turning the data from paper charts into a digital form requires the same level of care. Sophisticated production techniques and rigorous quality assurance procedures are required to produce good quality raster or vector charts and keep them regularly updated. These processes are more difficult and time consuming for vector data due to its complexity.

In conclusion

Enhanced vessel safety can be obtained by installing equipment from reputable providers, using accurate and up-to-date digital charts and lastly, but equally importantly, investing in appropriate training before bringing electronic charting systems into use. This is not just my opinion, it is a reflection of the feedback I have received. Certainly Broere Shipping think this is the case - they are investigating in more systems for installation of new buildings. Other companies are considering retrofitting existing vessels with the smaller, less expensive stand alone PC-based systems that are now becoming available.■